

HORTICULTURAL THERAPY ACTIVITIES
FOR THE REHABILITATION OF PHYSICALLY DISABLED CHILDREN

by

DEBORAH ANN BRENNAN

B.S., University of Massachusetts, 1975

A MASTER'S THESIS

submitted in partial fulfillment of the

requirements for the degree

MASTER OF SCIENCE

Department of Horticulture

KANSAS STATE UNIVERSITY
Manhattan, Kansas

1978

Approved by:

Richard H. Mattson

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ACKNOWLEDGEMENTS

I wish to acknowledge the assistance of Dr. Richard Mattson, Associate Professor, Department of Horticulture; Dr. Carl Clayberg, Professor, Department of Horticulture; and Dr. John Demand, Professor, Department of Administration and Foundations without whose guidance this paper would not have taken its present form. I wish to thank the staff, and particularly Mindy Houston and Maurine Post, of the Capper Foundation for Crippled Children, Topeka, Kansas who were cooperative in my efforts to evaluate their horticultural therapy program. Most of all I wish to thank the children of the Capper Foundation for their enthusiasm, their courage, and their friendship.

INTRODUCTION

Gardening and plant activities are becoming a part of the total therapy program in institutions dealing with the physical, mental and social disabilities of adolescent and adult populations. Horticultural therapy (and rehabilitation) has considerable potential in institutions, schools and hospitals specializing in problems and needs of children, especially physically handicapped children.

Information presented in this thesis is based on observations made at a rehabilitation center for physically disabled children. Horticultural activities were evaluated and specific instructional modifications and equipment adaptations developed. The manuscript presented is written in the style of the Journal of Rehabilitation and will be submitted for publication.

LITERATURE REVIEW

In conjunction with other therapies, but with the use of a living plant media and a natural environment as therapeutic tools, horticultural therapy helps handicapped individuals improve intellectual skills, emotional attitudes (through a changed self-concept), social skills (through non-threatening interactions with others), and physical skills (through activities requiring both gross and fine motor coordination.)⁵ These goals are now being achieved by many trained horticultural therapists in institutions dealing with the mentally ill and the physically disabled, in work centers for the mentally retarded, in geriatric centers, and in correctional institutions.

Horticultural therapy was used in rehabilitation programs for physically disabled soldiers in Veteran's Hospitals.⁷ After World War I horticultural activities gained further importance when occupational therapists used this as a therapeutic tool between 1920 and 1940. The term "horticultural therapy" finally became recognized in the rehabilitation of soldiers after World War II.⁸

Horticultural therapy continues as a rehabilitation tool for the disabled today. The Disabled Living Foundation in England researched and designed adaptive tools and gardens for handicapped adults.⁹ Greenhouses such as one at the Burke Rehabilitation Center in White Plains, New York, have been designed for the wheelchair gardener allowing the physically handicapped to experience the benefits of horticultural therapy.⁴

These modified horticultural activities and adapted tools, though, have been utilized primarily by the disabled adult. Overlooked has been the physically disabled child, especially the child with congenital physical handicaps. Disabled children are involved to a limited extent in horticultural therapy programs. The Institute of Rehabilitation Medicine in New York City utilizes the benefits of horticultural therapy for its traumatically disabled children as well as adults. Sophia Chiotelis, Director of the Occupational Department in 1971, stated that horticultural therapy "serves as a non-medical therapeutic method conducted in a natural environment. For many disabilities, it offers exercises in a disguised fashion and utilizes the patient's improvement in physical gains in a normal growth opportunities. They do not have the experience of learning. The garden work gives them that experience. The patients enjoy it. It raises their spirits and helps them to adjust to living with their handicap."² The Director of Psychological Services stated in 1975 that horticultural therapy "is able to adjust to the varying levels, both physically and emotionally, of disabled patients and besides its being able to deal with these levels simultaneously, horticultural therapy can be adjusted to the varying emotional reactions a person goes through as he or she learns to cope with the disability."¹

Physically handicapped children have benefited from horticultural activities as a result of volunteer garden club programs. The Chicago Horticultural Society, in particular, developed such a program for Chicago public schools which has helped the city's handicapped children. The C. Melvin Sharpe School in Washington D.C. also has a horticultural therapy program which has proven that the multiple-handicapped children are among the most enthusiastic gardeners and that spastic children

are able to improve their coordination through gardening activities.³

Most children's hospitals or rehabilitation centers have not included horticultural therapy in their general therapeutic program. According to McCandliss' 1968 survey, most children's hospitals state their patients are too short-term or too incapacitated to benefit from such a program.⁶ However, she admitted that the survey was inconclusive for only a few hospitals were sampled. Despite the extent of physical involvement, a physically handicapped child can be equipped with adaptive tools. Involvement in horticultural activities involves the physical tasks of propagation and repotting with the educational experiences of learning the needs of plants and plant names, thus allowing the child to experience the natural world. Despite the length of hospital stay, the disabled child will need to adjust to his or her limitations and capabilities. Horticultural therapy can assist in this physical and psychological adjustment if incorporated in the total therapeutic program.

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ABSTRACT

Incorporation of horticultural activities in a total therapy program assists the disabled child in strengthening weak muscles, improving bilateral, fine, and gross motor coordination. In addition to these physical improvements, horticulture stimulates intellectual and emotional development for the physically disabled child.

¹ Received for publication on _____, Contribution No. _____,
Department of Horticulture, Kansas Agricultural Experiment Station,
Kansas State University, Manhattan

² Horticultural Therapist, Connecticut Valley Hospital
Middletown, Connecticut

Horticultural therapy utilizes a living plant media and a natural environment as therapeutic tools to help individuals improve intellectual skills, emotional attitudes (through a changed self-concept), social skills (through non-threatening interactions with others), and physical skills (through activities requiring both fine and gross motor coordination).³ Institutions for the physically, mentally, and socially disabled of the adult and adolescent populations conduct the majority of horticultural therapy programs, tailoring the program activities to meet the needs of each institution's special population. In particular the physically handicapped adult, disabled as a result of stroke, rheumatic disease, or accident can become involved in horticultural activities by using adaptive tools and barrier-free gardens developed by the Disabled Living Foundation in England.⁴ Greenhouses such as one at the Burke Rehabilitation Center in White Plains, N.Y. have been designed especially for the wheelchair gardener.² Such modifications allow the disabled adult to participate actively in horticultural activities thereby providing adjustment to their disability and their environment.

In spite of horticultural therapy's flexibility to meet the needs of different populations, the program has been overlooked by many institutions, rehabilitation centers, schools and hospitals specializing in children's problems and needs. Though the adaptive tools, gardens and greenhouses are suitable for physically disabled children, horticultural therapy is rarely part of the total therapy program. The Institute of Rehabilitation Medicine in New York is one facility for physically disabled children that includes horticultural therapy in its total therapy program. There, horticultural therapy assists physically handicapped children not only physically but allows the child to experience

normal growth opportunities, thereby helping the children to adjust to living with their handicaps.¹

A physically handicapped child can be equipped with adaptive tools, or the activity can be modified to allow the child to experience the natural world. The disabled child needs to grow and to adjust to his or her limitations and capabilities. Horticultural therapy can assist in that adjustment.

OBJECTIVES

Indoor gardening and greenhouse activities were evaluated to meet the needs of children with cerebral palsy. Specifically, horticultural therapy goals included improving fine and gross motor coordination, bilateral coordination, strengthening weak muscles, overcoming visual handicaps, and encouraging head control. Further incorporated into the program were educational objectives to develop environmental awareness and possible leisure time interests.

Placement in the program was determined by the teacher's desire to expose the child to an environmental experience of the child's own interest in plants. Consultations with the child's occupational therapist and teacher assisted in formulating the specific objectives to fit each child's needs, for the degree of physical involvement varies considerably even among children with similar diagnoses.

IMPROVING BILATERAL COORDINATION

Children diagnosed as cerebral palsy spastic quadriplegia with bilateral coordination difficulties cannot perform a normal two-handed task until taught to do so. Horticultural activities that encourage bilateral coordination include the following:

- (1) Repotting plants requires that one hand be placed over the top of the pot securing the plant, while the other hand taps the turned pot on a table edge. Nonbreakable plastic pots and potbound durable plants such as Sansevieria are needed.
- (2) Potting plants requires one hand to hold the plant in place as the other hand fills the pot with soil.
- (3) Transplanting seedlings requires a coordinated manual manipulation of both hands. Marigold, peanut or coleus seedlings can be handled roughly without damage.
- (4) Propagating plants requires one hand holding the propagation while the other holds the cutting. Specially designed scissors for the handicapped are now on the market.
- (5) Designing terrariums and dish gardens encourages bilateral coordination by reinforcing the skills of unpotting and potting plants. Wide mouth gallon glass jars are inexpensive, easy to obtain and simple to plant into terrariums.
- (6) Macramé is a good two handed activity. Tying and tightening knots is much easier with two hands than one.
- (7) Making corsages or boutonnieres encourages two hand usage. The child must twist the wired flower with one hand while taping the wire with the other. Use Chrysanthemums or Carnations which can be

handled easily and are long lasting flowers.

Few activity modifications are necessary for this skill development if both hands are mobile, however patience is necessary for both the therapist and child for these relatively simple tasks can become complex and tedious to a handicapped child.

Horticultural activities encourage bilateral coordination even if the child is limited to one mobile hand. Two-handed tasks are performed with one hand as a stabilizer of an object, while the mobile hand completes the task. Examples of horticultural therapy activities are:

- (1) Plants for propagation can be stabilized by one hand as the more mobile hand cuts the stem. Lower leaves can be pinched off with one hand, a hole poked in the propagation media, and the cutting inserted.
- (2) Seedlings for transplanting need to be separated from clumps of seedlings. A dibble stick can be used to make holes for transplanting.
- (3) Plants for potting need soil scooped into a pot.
- (4) Macramé can be adapted, the mobile hand threading and tightening the knots as the immobile hand secures loose strings for knotting and tightening.

OVERCOMING VISUAL HANDICAPS

For the blind handicapped child, plant related activities open a world of textures, scents, and other sensory experiences. Slight modifications to the task procedures may enable the child to complete an activity independently. Procedures of propagation, potting, and watering must be explained in a sensory rather than a visual manner:

(1) Tall seedlings (tomatoes), large seeds (lima beans, peanuts), and durable plants (Sansevieria) will provide easier handling and insure more confidence in performing these new tasks.

(2) The blind child will need to feel, to determine the amount of soil in a pot, the length of stem and placement of leaves before taking a cutting, and the moisture content of the soil.

(3) Tactile senses are enhanced further through discussion of plant leaf texture, size and shape (rubber tree vs. velvet leaf).

The scents of various plants and flowers (scented geraniums, citrus flowers) add to sensory experiences and awareness of the physical environment.

Continued use of sensory skills will lead to good plant maintenance skills of potting, transplanting and propagation. With these skills, another benefit can be achieved for the child handicapped by both cerebral palsy and blindness, that of better bilateral coordination.

ADAPTING TO PALMER GRASP

A child diagnosed as cerebral palsy spastic quadriplegia may be handicapped to the extent that only one arm is functioning and that one arm is limited by the hand's palmer grasp. Horticultural activities, such as propagation, potting plants, seeding and transplanting, sandscape designing and macramé can be modified to fit the child's limitations. Specific examples are:

(1) Propagation of stem cuttings may be done by the pinching reflexing action of the child's forefinger and thumb to break off a terminal stem section of a plant. Succulent stemmed plants will be needed to insure easy breakage. The other steps of propagation involve filling a container with propagation media, placing the cuttings in the container

media, and watering. Each step can be performed independently.

(2) The palmer grasp may require further task modifications, for tools such as scissors may not be useable. A spoon or handful of soil may only be steadily secured for a few seconds. Soil, water, or other materials should be placed adjacent to the container. A spoon handle bent at a ninety degree angle may reduce spillage and encourage more independent handling. Large seeds or strong seedlings are needed for seeding or transplanting, to survive the quick spastic reflexive grasp.

(3) Macramé is a possible activity; however, assistance is necessary. to facilitate easy grasping, one inch square blocks can be tied to the ends of the string but if the child's fine motor coordination is poor, threading and tying of knots will be difficult and a therapist's assistance will be necessary. This project easily becomes tedious, for each knot requires slow careful movements. Interest is easily lost. A complete macramé project such as a plant hanger may not be suitable then, but working on single knots would assist in increasing use of the palmer grasp.

ENCOURAGING HEADSTICK ACCURACY

A child diagnosed as cerebral palsy spastic quadriplegia can be so handicapped that arms or legs are uncontrollable or immobile. The child's head movement may be the most controllable action. For this handicap, the child may be taught to use a headstick, a metal pointer attached to a headband, in order to perform tasks such as pointing or typing. Developing proficiency with this tool is a long tedious process and the child often becomes frustrated. Horticultural activities can disguise accuracy exercises, with the hope of less frustration and more success.

Modifications for horticultural activities are necessary and therapist attention and assistance should always be present.

(1) For potting plants and mixing soil, a lightweight plastic shovel can be affixed with tape to the headstick, concave side down to prevent soil being thrown over the child's head if the head is suddenly tilted upwards. Depending on the degree of accuracy a well defined work area may be helpful to increase concentration. A three sided box, with a pot inside, taped, lying down facing the open end will permit the child to push the soil forward into the pot with the shovel. The box needs only to be twelve inches long and it should be placed on top of a table suitable for access from the wheelchair height. Later, as headstick accuracy improves, the child could scoop up the soil and place it into an upright pot. Therapist assistance will be needed to place the plant as the child pushes more scoops of soil around it.

(2) Headstick accuracy exercises can also include planting seeds. Large seeds such as nasturtium, peanut or lima bean allow for better viewing and also for greater success when poking them into soil with the headstick point. Pots should be filled with soil, then seeds set on the surface. The seeds may be covered by accurate pokes or by moving the soil near the seeds, if the accuracy is poor.

(3) Initially, if headstick accuracy is poor, all of these tasks will take a long time to perfect and the child may become frustrated. At this time more successful and familiar approaches could be inserted to regain the child's self-confidence and motivation. Flashcards with various plant pictures of flowers, greenhouses, trees, cacti can be presented. The child is asked to point to the correct term spoken or presented by the therapist. This will provide an opportunity to maintain the present headstick accuracy skills and to learn some

horticultural vocabulary.

(4) In reviewing plant terms and names, sensory stimulation can also become part of the activity, allowing the child to feel the soft, hard or sharp textures and to smell the various scents of flowers and leaves. As headstick accuracy improves, tasks can become more complex and more independent; but until that time, tasks should be simple and offer the least frustration and the greatest opportunity for success.

IMPROVING FINE AND GROSS MOTOR SKILL

For every handicapped child, horticultural activities can encourage improvement of fine or gross motor skills. Gross motor skills are used when a child works within a greenhouse bending, stretching or reaching to water plants. Gardening outdoors, in either raised or ground level garden beds, encourages more use of arm and back muscles to bend and reach as the child hoes or rakes. Indoor and outdoor gardening require fine motor skills as well, to plant, pull weeds, mix soil, take cuttings, and transplant seedlings.

ASSESSMENT

Strengthening weak muscles and improving poor coordination takes many months of exercise. Lack of progress results in frustration, lack of motivation and poor self-image. Horticultural therapy encourages physical exercise and motivation through a living, flexible, and enjoyable media - plants. Physical gains can be achieved by stressing coordination and physical actions with equipment adaptations in an informal and relaxing environment. Bilateral coordination, fine and gross motor skills, sensory awareness, and the use of a palmer grasp can be encouraged and

improved. Some skills, such as a headstick accuracy, can be improved as activities are continued. Physical achievements are influenced by the nature of the disability and a combined effort of all the therapies, including horticultural therapy, the family, and especially the child's own desire to improve.

Horticultural activities also provide a range of educational experiences for disabled children. The physically disabled child can learn to recognize and perform plant maintenance needs according to his physical capabilities. Exposure to nature allows for increased awareness and understanding of their environment.

Horticultural projects can continue in the home environment with a minimal amount of equipment modification. A work area suitable for the child's wheelchair height, a spoon bent to facilitate easy scooping, a lightweight shovel for weak hand muscles, or raised window boxes to serve as outdoor gardens will suffice. The child must possess confidence in his or her own capabilities to pursue this interest. If confidence is not self initiated, family encouragement will be needed.

CONCLUSION

The disabled child must learn to function in both the therapeutic and home environment. The flexibility of horticultural therapy activities provides a bridge between these two environments. Horticultural activities are effective for physical improvement and provide an opportunity for intellectual and emotional advancement for the physically disabled child. Continuation of the gardening skills as a leisure time activity provides physical exercise to maintain and improve physical gains; learning experiences to stimulate new interests; and self satisfaction (through rewarding experiences) to improve self image; thereby enabling the child to develop self awareness to their disability and their environment.

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APPENDIX I: INSTITUTIONAL SETTING

Horticultural therapy activities were conducted at the Capper Foundation for Crippled Children in Topeka, Kansas during a five-month period. The center provides services in physical, occupational, speech, recreational, and music therapy as well as psychological testing and a complete special education program from pre-school to high school for children with cerebral palsy, spina bifida, muscular dystrophy, polio and other physical disabilities. The horticultural therapy program, affiliated with the occupational therapy department, was designed to encompass occupational and physical therapy goals of fine and gross motor coordination as primary objectives. Also, incorporated into the program were educational objectives to develop environmental awareness and possible leisure time interests.

Reasons for placement in the program were to expose children to an environmental educational experience, and to stimulate an interest in plants. Consultations with the child's occupational therapist and teacher assisted in formulating the specific objectives for the child's ability. Assessment was recorded daily of the child's progress.

The horticultural therapy program included 3 to 6 children in group activities in the various classrooms or individual activities in a 9 X 21 foot lean-to greenhouse attached to the occupational therapy department. The greenhouse had perimeter raised benches 31" high by 30" wide. Activities were 1/2 hour sessions either once, twice or three times weekly depending on the group's or individual's free time.

The individual children and their progress provides the basis for this evaluation. Specific cases have been chosen to illustrate the scope of horticultural therapy activities in dealing with disabled

children and to provide examples of some simple tool adaptation. All the children in the individual program were confined to wheelchairs and most of these children were diagnosed as having cerebral palsy. Yet each child's program was designed to fit his or her specific needs, for the degree of physical involvement varies considerably even among children with similar diagnoses. The individual evaluations will illustrate clearly the need for individual consideration and adaptations in order that each child benefit fully from horticultural therapy activities.

APPENDIX II: CASE HISTORIES

Don: Born: 9/27/63 Diagnosis: Cerebral Palsy spastic quadriplegia and legally blind (20/400)

Don's whole body was tight, particularly his legs and arms. He wheeled himself to each session using both hands and could perceive images within five inches of his eyes. His program consisted of two half-hour sessions weekly with objectives including encouragement of bilateral coordination, tactile awareness, and development of plant maintenance skills as a possible leisure time interest.

Don's program improved bilateral coordination from 80 to 90% within a 5 month period. The use of both hands together was measured over five minute trial periods for three consecutive therapy sessions for each measurement block. The blocks involved initially no coaxing to using two hands per opportunity, two reminders per opportunity, one reminder per opportunity and finally no coaxing.

Various activities encouraged bilateral coordination such as potting and repotting plants, propagating plants, transplanting seedlings and mixing soil. Designing dish gardens and terrariums further reinforce this skill.

Modifications included the use of tall seedlings, large seeds and sturdy plants for better and more stable handling, and relating the procedures of propagation, potting and watering in a sensory rather than visual manner. Don needed to feel with his fingers in order to determine the amount of soil in a pot, the length of a stem or placement of leaves before taking a cutting, and the moisture content of the soil. This use of tactile senses plus a constant discussion of the texture, size and shape of the plant or seeds in use encouraged tactile

awareness. Through better tactile awareness he attained good plant maintenance skills (i.e. potting, transplanting, propagation) and with these skills came improved bilateral coordination.

Horticultural therapy initiated a new hobby for Don. He absorbed much information about plants, distinguishing at least five plant varieties and independently completing the steps involved in potting, transplanting, and propagation by stem cuttings. He understood plant culture so well he could convey how these needs of light, water, temperature, and air were satisfied in a terrarium. He diligently cared for his plants and terrarium, frequently describing their progress. Perhaps this is the greatest benefit of the entire program, an interest that continued to reinforce the skills, the coordination, and the knowledge he learned.

Reggie: Born: 8/23/63 Diagnosis: Cerebral Palsy

Reggie's whole body was weak but he wheeled himself to the half hour session each week. He could use two hands together, the left hand serving as a stabilizer for an object as the right hand performed the task. Reggie's program included encouragement of this bilateral coordination and the development of a horticultural interest for a leisure time activity.

Progress was slow and inconsistent at first due to absences because of illness and doctor appointments. Yet as Reggie's attendance increased so did his abilities. Plants for propagation seedlings for transplanting and pots for repotting could all be stabilized by Reggie's left hand, while the right hand performed the more difficult tasks of cutting a stem, separating a clump of seedlings or scooping soil into a pot. Macramé proved to be the best two hand activity, the right would thread the knots as the left hand secured the other strings.

All these activities could be performed independently and skillfully, yet despite these capabilities each activity required the therapist's verbal reassurance. This lack of self confidence prevented his pursuit of plants as a hobby. The plant propagated and cared for by Reggie in the greenhouse became the responsibility of his parents when taken home. In order to preserve this interest and maintain his skills, Reggie's capabilities must be encouraged and assured. Such support was available through the therapy sessions; however, the support was unavailable within his home environment. Only through constant support can Reggie better his skills and his self-confidence and thereby achieve physical and psychological adjustment.

Mike: Born: 6/14/69 Diagnosis: Cerebral Palsy spastic quadriplegia

Mike's spasticity of arms, head, and trunk and inability to control his arms required him to be wheeled to his one half-hour session each week. His only means of communication were yes/no head responses and pointing to words, objects, and pictures with a headstick. These head movements were Mike's more controllable motions yet even these were weak. Therefore, strengthening for the head control was one of Mike's program objectives. More specifically, headstick accuracy was emphasized in order to improve communication and physical skills.

Modification of Mike's program included a light weight plastic shovel affixed to his headstick with the goal of attaining greater accuracy and a new skill through filling pots with soil. The shovel was taped concave side down to prevent soil being thrown over his head. A special working area was needed because Mike's wheelchair was lower than the greenhouse benches. A low folding table provided this need. A three-sided cardboard box was taped to the table. Inside the box a four-inch pot was laid facing the open side, and soil was piled approximately five inches in front of the pot. In this manner Mike's working area was clearly defined.

During the first session, this new form of exercise thrilled Mike. For twenty minutes, he diligently worked to keep his shovel within the box and despite many unsuccessful attempts in pushing the soil forward, Mike continued until the pot was filled within one inch of the edge. A plant was then inserted by the therapist. Succeeding sessions lacked this motivation and determination, resulting in less headstick control and accuracy. Frequent absences also interfered with this activity's consistency and success. The incentive of bringing home his potted plants failed to encourage extra efforts. In later sessions, poor head control kept the shovel outside the box. When the shovel did manage to come

inside, Mike's accuracy in pushing the soil forward into the pot was poor as well. No longer motivated to do well, pots were filled only half full after a thirty minute session. Since headstick accuracy was not being achieved through this method a new activity was introduced. Large seeds of nasturtium, peanuts and lima beans were to be poked into a peat pellet or pot with the headstick. The peat pellet (approximately two inches in diameter) proved too small an area to focus on accurately with a headstick so pots filled with soil and topped with seeds were used. This method proved to be difficult as well. Accurate headstick placement above the seed was impossible, the seeds would be covered eventually by soil from missed pokes. Neither of these activities advanced headstick accuracy, and Mike lost his motivation once again and so the program changed once more.

The new activity involved recognition of the terms "flower," "greenhouse," "tree," and "cactus." Acknowledgement of these terms was through yes/no head responses when shown various plant specimens of pictures or by pointing his headstick to the correct 3 x 3 inch picture on a card. This task delighted Mike. He could point accurately to the correct picture with little difficulty. He learned all the terms within four sessions. The physical contact with many of the greenhouse plants during these sessions provided a sensory experience for Mike as well. Soft, hard, sharp, and smooth textures were displayed but not learned due to lack of time.

Learning terms through familiar communication skills provided Mike's greatest success. This success may be related primarily to his familiarity with the process. Mike knew he could succeed in these methods because they were used constantly in his daily routine. Learning newer skills required more effort and less assurance of success. The fear of trying something new, the fear of failure kept Mike from succeeding. More

time was necessary to overcome this fear and to achieve better headstick accuracy. Although horticultural therapy did not teach Mike any new skills, he did advance intellectually, learning the four terms and, perhaps more importantly, plants provided a source of pleasure for Mike - a reason to smile in excitement.

Cathy: Born: 2/14/61 Diagnosis: Cerebral Palsy

Cathy's upper extremity was mobile and she could wheel herself to the three weekly half hour sessions. She possessed good coordination and fine and gross motor skills which were used throughout the program to involve her with plants for a possible leisure time activity. A minor program objective included physical exercise to encourage weight loss.

All activities were performed independently and skillfully. Propagation techniques of stem cuttings and root division, seeding and transplanting, potting and unpotting plants, designing sandscapes, dish gardens and terrariums, as well as corsage making and flower arranging presented no physical obstacles. To encourage more understanding of plant maintenance care and more exercise, Cathy was assigned care of a greenhouse section. This work especially intrigued her as evidenced by frequent requests of the various plant names in her section and by discussions of the plant characteristics. Cathy eventually learned about six plant names within her section. Bending and stretching were also part of this assignment, however such exercise was so erratic that weight loss could not be confirmed.

Horticultural activities fascinated Cathy but they also demonstrated her poor self-image. During the propagation unit, she was anxious, but doubtful, about the success of her cuttings. A pessimistic attitude prevailed as she took the cuttings. Yet in successive sessions she always peeked to see if roots had developed. This pessimistic attitude was maintained until the cuttings did root and then a positive remark would be made. This positive feeling was soon counteracted by another negative remark such as "the plant won't live long." To her own amazement, she was able to keep the plants alive. Such reactions of doubt and belief of failure were familiar to all projects. She believed the seeds or plants

would never grow; the sandscape, terrarium, or flower arrangement would never be attractive. Results proved her belief wrong; and quietly she would admit her achievement.

Horticultural therapy projects did encourage a new interest for Cathy. She continued to care for her plants at the residence and would relate their progress. Her success with plants and other projects have improved her self image. Though this self confidence remains silent, perhaps with more rewarding experience a more verbal and visible self confidence can be achieved.

Mary: Born: 8/25/60 Diagnosis: Cerebral Palsy spastic quadriplegia and a moderate level of mental retardation.

Mary wheeled herself to the bi-weekly one-half hour horticultural therapy sessions. Her arm and hand movements were slow and fine motor ability poor. Her program included activities to encourage bilateral coordination, develop problem solving abilities, and a new interest for a possible leisure time activity.

Bilateral coordination improved from 32% initially to nearly 100% at the conclusion of the program. Measurements were recorded in the manner described in Don's case with three five-minute trial periods within each measurement block. Activities such as potting, unpotting plants, propagation, sowing and transplanting seedlings and macramé utilize two hands but initially Mary would attempt the task single handed until through coaxing two hands were used. The macramé project proved to be the best two-handed activity, as one hand immediately proved to be impossible at tying a knot. Designing a terrarium^m, dish garden, or corsage further reinforced bilateral coordination. Equipment modifications were not necessary for any projects. Assistance was needed only for confusing task procedures, such as placement of hands for unpotting a plant or taping a corsage. Further explanation or illustration permitted independent completion of the task. Improved horticultural skills improved bilateral coordination as well.

During the sessions, constant review occurred of particular horticultural skills and information, such as when to water a plant, procedures for propagation and repotting. Eventually, Mary was able to adequately answer questions dealing with these topics. Projects which were seldom reviewed presented more difficulty in solving related questions. An explanation of the care of a terrarium or how to start an avocado seed

necessitated recalling the task's procedures and often rephrasing the question in a simpler form before the question could be answered. Similarly, plants reviewed from the onset of the program could be recalled but new plants could not. Mary's problem solving ability definitely corresponded to constant review. Without this review Mary was unable to solve the problem independently.

At the conclusion of the program, Mary was able to perform plant maintenance skills adequately and independently. Her interest in plants prevailed throughout the sessions, for she frequently asked about the progress of her cuttings or plants at the following activity session. The interest continued for Mary and she stated she would care for her plants at home but only by the task of watering. The more difficult tasks of repotting and propagation, tasks she is capable of performing, would be assumed by her mother. Despite her success within the therapy sessions, Mary still lacked the self confidence to perform the tasks independently in her home environment. Only through family support can Mary's confidence grow and Mary be able to pursue this interest alone.

Neil: Born: 4/24/67 Diagnosis: Cerebral Palsy spastic quadriplegia

Tight arm and leg muscles and weak trunk muscles required Neil to be wheeled everywhere. The limited use of his left hand's palmer grasp was Neil's only functioning limb and so one half-hour weekly horticultural therapy session was designed to encourage use of this hand.

Activities included performing propagation by stem cutting and learning the materials needed for this procedure, potting plants, sowing seeds, transplanting, sandscape designing, and macramé. Completion of these tasks required some modification and at times assistance, but Neil did use his left hand during all the sessions. A tray designed especially for Neil accompanied him to all sessions and provided a suitable work area.

For the first sessions, a plant such as Tradescantia sp. (Wandering Jew) was placed on the table and various cutting tools were used. Neither a left handed scissors or rocker knife could be handled successfully by Neil, so the only means of cutting was pinching actions of the forefinger and thumb. Cuttings were limited to plants with succulent stems in order to promote this independent motion. All other steps from insertion of the stem into rooting hormone, placement in a pot, and watering could be performed independently.

The inability of Neil's grasp to hold a spoon of water or a handful of soil over a space of five inches required soil or water to be placed adjacent to the pot in use. To water, a spoon was bent to form a right angle for better handling. This spoon was also used in sandscape designing. Large seeds and seedlings were utilized for seeding and transplanting, with particularly strong seedlings used in order to survive Neil's quick reflexive grasp.

The only activity requiring constant assistance was the macramé project. Neil's left hand pulled and threaded strings with one inch

square blocks tied to the ends to facilitate handling. Another hand, the therapist's, was needed to tighten knots and for intricate threading. Resenting this assistance and the length of time to tie one knot, Neil lost interest in the activity. After two sessions and six knots the activity was discontinued.

The majority of Neil's program tasks allowed independent use of the left hand's palmer grasp, although lack of accurate control required materials to be placed adjacent to one another. As left hand coordination improved Neil's self confidence increased. Neil enjoyed his new independence and frequently voiced his desire to demonstrate his ability. By bettering Neil's physical ability through horticultural activities, the important therapeutic goal of improved self image was achieved.

HORTICULTURAL THERAPY ACTIVITIES
FOR THE REHABILITATION OF PHYSICALLY DISABLED CHILDREN

by

DEBORAH ANN BRENNAN

B.S., University of Massachusetts, 1975

AN ABSTRACT OF A MASTER'S THESIS

submitted in partial fulfillment of the

requirements for the degree

MASTER OF SCIENCE

Department of Horticulture

KANSAS STATE UNIVERSITY

Manhattan, Kansas

1978

Horticultural therapy activities were conducted at the Capper Foundation for Crippled Children in Topeka, Kansas during a five-month period. The center provides services in physical, occupational, speech, recreational, and music therapy as well as psychological testing and a complete special education program from pre-school to high school for children with cerebral palsy, spina bifida, muscular dystrophy, polio, and other physical disabilities.

All of the children participating in the horticultural individual treatment program were confined to wheelchairs and most were diagnosed as having cerebral palsy. Each child's progress at horticultural tasks and adaptations in equipment and teaching methods was recorded. As a result of modified tools, such as lightweight shovels, and tasks of potting plants, mixing soil and taking cuttings, the disabled child strengthened weak muscles, improved sensory skills, improved bilateral, fine and gross motor coordination, and maintained headstick control.

Continuation of horticultural skills and interests provides the disabled child with physical exercise to maintain and improve physical gains; learning experiences to stimulate new interests; and self-satisfaction to improve self image; and thereby enable the child to adjust to himself, his disability and his environment.